duty of cultivating it in the best possible manner; on the urban side the people must realise that the country ought never again to be so dependent on sea-borne food as it has been during the past fifty years. Henceforth, Mr. Turnor urges, security of supply must be the motto, instead of a cheap supply at all hazards; and, lastly, the workers themselves must have a new outlook, and realise that salvation for our future economic troubles lies in unrestricted, and not in restricted, individual output.

Mr. Turnor argues his case extremely well, and drives home his arguments with numerous diagrams illustrative of his statistics.

One of the secondary effects of the war is that agriculture is fast becoming a controlled industry, and experiments in organisation are being tried now on a vastly larger scale than before. Already some of the suggestions of the reformers have been carried out. We have minimum prices; we shall soon have a minimum wage. The Game Laws have had a hole knocked through them, and in several directions the new conditions are advanced beyond the wildest dreams of 1914. We shall soon see how the new order is going to work, and in the meantime we can only welcome the fullest discussion of the agricultural problem as it is and as it seems likely to shape itself.

Morphology of Invertebrate Types. By Dr. A. Petrunkevitch. Pp. xiii+263. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1916.) Price 6*s.* net.

This volume is divided into twenty-eight chapters, each dealing with one type. Each chapter consists of a description of the systems of organs of a type and a series of instructions to be followed in the examination of the animal. Much importance is rightly attached to the drawings which the student is directed to make, and to do away with any tendency to copy the figures included in the book these are either diagrammatic or represent some related type. This latter device has here and there its disadvantages, *e.g.* the figures of Ankylostoma and Wilsonema are of relatively little use in aiding the student to understand the structure of Ascaris; there are too many differences between Ascaris and the types figured.

The descriptions are accurate, and on the whole well done, though some parts are too short, *e.g.* the accounts of the nephridia of the earthworm and of Nereis are inadequate. The types chosen are all found in America, except the Trematode *Dicrocoelium lanceatum* and the medicinal leech, but many of them occur also in Britain or are closely similar to British species, and the book will therefore be helpful to those "on this side" who desire an account of the general anatomy of such types as Pennaria, Sertularia, Tima, Aurelia, Dendrocœlum, Daphnia, a spider (Agelena), Asterias, Venus, Limax, Loligo, and Molgula. But in most laboratories in this country where similar types are studied, probably more attention is devoted to the finer structure of some of the organs, *e.g.* the nephridia cited above.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of Nature. *No notice is taken of anonymous communications.]*

The Horizontal Temperature Gradient and the Increase of Wind with Height.

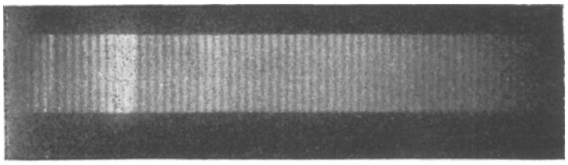
If the horizontal layers of air were isothermal (the upper layers having the lower temperature), then the gradient winds at different heights would be proportional to the temperatures (absolute) at those heights. Consequently the wind would decrease with height, and although a higher temperature at a given altitude over the higher pressure is a necessary corollary of an increase of wind with height, the converse is not necessarily true. It is clear on reflection that with such a temperature distribution as that described above, the temperature at any point in BD of Mr. Dines's diagram in Nature of March 8 (p. 24) would be below the temperature at the corresponding point in AC, so that BD would be less than AC, and consequently v less than V; but the actual relation runs some risk of being obscured by Mr. Dines's use of isobaric surfaces which in other respects gives an admirably simple exposition of a theorem in atmospheric dynamics, and shows also that if the isobaric and isothermal surfaces coincide there is no variation of wind with height. Incidentally, during the past winter months the mean isotherms have run from N.W. to S.E., and have given at 6000 ft. a N.W. "thermal" wind of about $1\frac{1}{2}$ metres per second superposed on the wind between 1000 and 1500 ft.

E. Gold.

Meteorological Section, R.E., March 16.

A Fixed System of Grating Interference Bands.

I wish to direct attention to a very remarkable property possessed by one of the systems of interference bands which make their appearance when white light is reflected from a plane replica-film grating, backed by a parallel silvered surface separated by a film of air. The appearance of the fringes in question is shown in the accompanying photograph, when the grating has 14,508 lines to the inch and the air-space is 0·0740 cm.



This system of bands, when examined by a spectrometer with a fixed collimator, remained *absolutely fixed* in the field of view of the telescope as the grating was rotated. This rotation has the effect only of moving the spectrum to and fro across the field of view without, in the least, altering the position of the dark fringes. This important property, which is uniquely exhibited by these fringes, seems to have escaped the notice of Prof. C. Barus, who has dealt with grating interferences and with their application to the displacement interferometry in a series of papers which appear in a collected form in the monograph "On the Production of Elliptic Interferences in Relation to Interferometry" (Carnegie Publication No. 149, 1911).

© 1917 Nature Publishing Group

The fringes appear to be due to the interference between two portions of light arising out of the single beam incident on the grating, one of them being reflected at the silvered surface and then diffracted out by the grating element which it meets, and the other being diffracted into the air space by the same grating element and then reflected out by the silvered surface. The path difference is equal to

$$2t(\cos X - \cos\phi)$$

where ϕ and X are the angles of incidence and emergence respectively, and t the thickness of the air film. Therefore the condition for interference is

$$2t(\cos X - \cos\phi) = \frac{2K+1}{2}\lambda \quad . \; . \; . \; . \quad (1)$$

where K is an integer.

But since we are using the grating, ϕ and X are connected by the relation

$$d(\sin\phi - \sin X) = n\lambda \quad . \; . \; . \; . \; . \quad (2)$$

where d is the grating interval and n the order of the spectrum.

Hence, dividing (1) by (2), we have

$$\tan\frac{\phi+X}{2} = \frac{(2K+1)d}{4tn}$$

In this equation $(\phi+X)$ is the angle which the direction of any particular dark fringe makes with the incident light, *i.e* with the axis of the collimator. Since $(\phi+X)$ is determined once for all independent of the position of the grating, the absolute fixity of the fringes is accounted for. A detailed paper on this subject was laid before the session of the Indian Science Congress held at Bangalore in January, 1917.

C. K. VENKATA ROW.

6 Singarachari Street, Triplicane, Madras,
S. India, February 10.

Mountain Sickness.

THE reference in the Notes columns of NATURE of January 25 (p. 415) to the physical failure experienced in mountain-climbing at high altitudes sent me to the very instructive (and suggestive) article by Dr. A. M. Kellas in the *Geographical Journal*. And the great interest now attached to one of the inevitable problems of the immediate future gave me to think that a few supplementary notes might be of sufficient interest for publication. The "mountain sickness" which forms the association that specially interests the physiologist and the physician was impressively brought under the notice of the latter in the "fall" of the fifteenth century; when the gold-thirst of the ruthless Spanish invader of the western Eldorado made *him familiar with its symptoms directly after reaching* the very elevated backbone of the southern section of the New World. The oldest special description that appeared in print would seem to have been that of Da Costa; and the very human appetite for novelty proceeded very soon to make the "*mal de montagnes*" a phrase-name as familiar to Western Europe as that of the *mal francais*—so very unhappily—rapidly came to be. The syndrome was referred to in the various linguistic territories bordering the giant Cordilleras as: *Soroche, mareo des Cordilleras, asthma des montagnes,* etc. And the native prophylactic, on the colossal slopes and towering cliffs of the Cordilleras of Peru, was slow and continuous mastication of prepared pellets of the dried juices of *Erythroxylon coca*—the original version of American "gum-chewing." The phenomena came in time to receive definite scientific discussion, notably at the hands of Bouguier ("Voyage en Peru") in 1745, and Condamine (of Peruvian bark fame) in 1751.

As world-wide scientific mountaineering developed—along lines of modern evolution—a number of French and German observers came to depict in turn their personal experiences of the symptom-group: Saussure, Clissold, Barry, Rohrdoff, Zumstein, Lepileur, Martins, and Bravais—according to their several personal experiences on Mont Blanc; Humboldt, Boussingault, and Hall—on the upper reaches of Chimborazo. As might be readily anticipated, in a personal experience in which individual constitution and previous training count for so much, we are told by the illustrious Humboldt that: "Ces phénomènes sont très-dissemblables suivant l'âge, la constitution, la finesse de la peau, les efforts antérieurs, les forces musculaires," etc. It very obviously corresponds in great, though not exclusive, measure to the "incommodités" of the *balloon* ascent of Biot and Gay-Lussac, on "le 6 fructidor, an XII" (August 24, 1804)—greatly exaggerated, of course, and developing at a lower altitude, from the very laborious ***muscular exertion*** of mountain-climbing. The latter rivals, as a factor in physiological derangement, the ***suddenness*** of change of environment in a balloon ascent, which bars off all chance of the gradual adaptation which would be so very necessary for functional adjustment.

JOHN KNOTT.

Dublin, March 2.

BORNEO AND ITS INHABITANTS.[1]

AS explained in the author's unfinished introduction, this book is a somewhat disconnected account of the natural history of Borneo, compiled from notes while he was in charge of the Rajah of Sarawak's museum at Kuching.

The first chapter deals with the mammals, and, as might be expected, considerable space is devoted to the orang-outang, or, as the author prefers to call it, the "Maias," this being its correct Malay name. It is satisfactory to learn that this interesting representative of the human family is still abundant, though local, in Sarawak. Though the fauna of Borneo is lacking in many of the larger mammals that appeal to the sportsman, it has at least its full share of remarkable forms among the smaller species. Many interesting details are given of that extraordinary little lemur, the Tarsier, *Tarsius spectrum*, and of the so-called flying lemur, *Galeopithecus volans*, that puzzle for systematists which has now the distinction of an Order to itself. The remarkable colour relationships between the squirrels of the island and certain unpalatable tree-shrews of the genus Tupaia are discussed at length. The relations of palm civets with coffee are at first sight far from obvious, but those of our readers who obtain their coffee from Borneo and are curious as to the previous history of the best quality berries should consult p. 33! It is of peculiar interest to find the mouse-deer taking the place in the native folk-lore of "Brer Rabbit," the latter itself being a direct descendant of the hare which always figures as the cunning hero in equatorial Africa.

The second, third, and fourth chapters are de-

---

[1] "A Naturalist in Borneo." By the late Robert W. C. Shelford. Edited, with a Biographical Introduction, by Prof. E. B. Poulton. Pp. xxvii+331+xxxii plates. (London: T. Fisher Unwin, Ltd., 1916.) Price 15*s*. net.

© 1917 Nature Publishing Group